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TITLE: Apparatus for treating a surface with a liquid

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With the system according to the present invention, not
only is the reaction
force of the spray beam compensated for fully but, indeed,
even an adhering
effect that is a component of force effective to hold the
apparatus on the
surface, is created according to the so-called hydrodynamic
paradox. This is
true because the flow velocity of the secondary stream of
the sprayed liquid
between the diverting flange and the surface being treated
is so high that the
static pressure in this region is smaller than that which
is effective on the
flange from outside, this latter pressure being equal to
the static pressure in
the surrounding water or the surrounding air. Thus the
diffuser or diverting
flange and, therefore, the spray beam are drawn toward the
surface with a force
dependent on the pressure/volume ratio of the water stream
or streams and the
surface area of the diffuser turned toward the surface
being treated. In
addition the diffuser is, jet-pump fashion, partially
evacuated by water
flowing due to the **Coanda** effect over the inside of the
diverting flange. The
liquid stream is induced to flow along the inside surface
of the diffuser and
be deflected thereby laterally outwardly due to the **Coanda**
effect and, at the
location between the primary stream flowing toward the
surface being cleaned
and the secondary stream flowing parallel thereto, the
change in direction is

effective like a jet-pump to evacuate the interior of the diffuser and to draw
the arrangement toward the surface being cleaned. See p. 244 of Introduction
to Mechanics and Heat, by N. Frank (McGraw-Hill, 1939) for a discussion of the
physical principles involved.

The arrangement of FIGS. 1, 2, and 5 has a diffuser 5 of hyperbolic cross
section so that the spray 7 will tend to follow the inner surface of the
diffuser 5 outwardly according to the **Coanda** effect. The rollers 9 are
adjustable to vary the spacing A as is shown by arrow C, and may be replaced by
casters or simply sliders. The nozzles 3 are spaced apart by a distance B
equal to half of the longitudinal length of the longitudinally elongated
diffusers 5 shown in cross section in FIG. 5 and in end view in FIG. 2.